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BY

H. CLIFTON LUKE, M.D.,

NEW YORK.

Anesthetist to St. Luke's Hospital.

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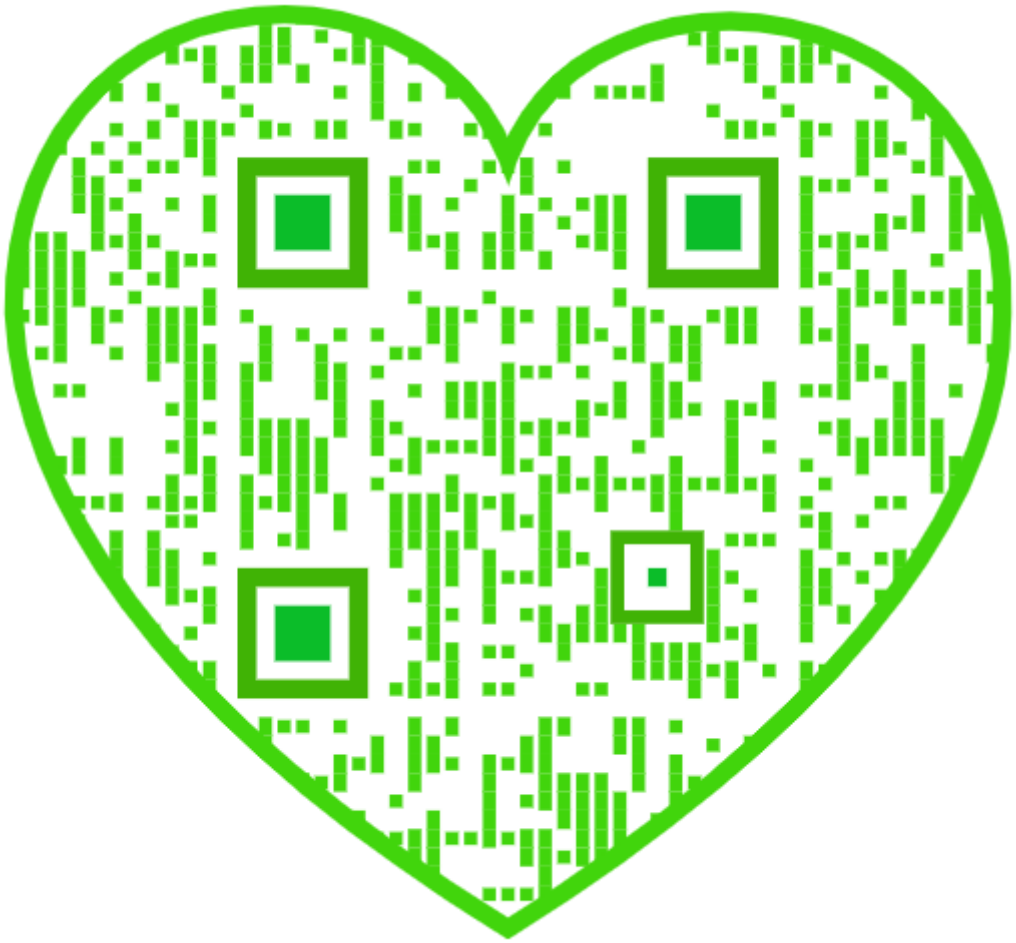

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ETHER-OIL RECTAL ANESTHESIA; SOME THEORETICAL CONSIDERATIONS.

By H. CLIFTON LUKE, M.D.,

NEW YORK.

ANESTHETIST TO ST. LUKE'S HOSPITAL.

THE administration of ether per rectum has once more taken on a certain degree of popularity, the present advocates of the method using it in the form of an oil-ether enema. The results here, in the hands of experienced anesthetists, have been variable, some praising, others disfavoring the method. There are some theoretical objections, however, to the procedure, and it is the purpose of these remarks to deal with the subject chiefly from this viewpoint.

The usual technique, omitting special refinements, is in brief as follows: Effort is made to thoroughly cleanse the intestinal tract, especially the large intestine, beforehand; a hypodermic injection of morphine, sometimes in combination with atropine or hyoscine, is usually given one-half hour before injecting the ether; the mixture of ether and oil (olive oil being mostly used), containing about seventy-five per cent. ether in adult cases, is given in a single dose of six to eight ounces by volume very slowly through a small catheter

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into the lower bowel. This is injected about thirty minutes before operation, the patient being in bed until the unconscious state is reached. If surgical anesthesia is not obtained in thirty to forty minutes, more ether is injected per rectum or administered for a brief time by inhalation.

Can we say that this method is founded on a good scientific basis? In other words, is it exact or accurate? The administration of ether, to be exact within a reasonable meaning of the term, should have the dosage, or amount administered, under direct control, which in turn exercises a fairly definite influence on the dose or amount actually absorbed. This fundamental requirement does not appear to be fulfilled here: (1) because the entire dosage is estimated, and placed in the intestine for absorption before essential information is acquired by the anesthetist regarding, (a) length of time the operation will take (which is often impossible to know), (b) the patient's resistance, susceptibility, or even special idiosyncrasy to the drug; (2) because a portion or all of the mixture may be expelled and lost, in which event an estimation of the amount still retained would be largely guesswork; (3) since there is also a small chance of error if the mixture is given in the usual manner by pouring through an open-topped funnel; over a period of five minutes material loss by evaporation could occur.

Then, in reference to the important question of dose there also appears to be considerable uncertainty, and the reasons for this are: (1) the influence of the inaccurate dosage as pointed out above; (2) the patient's age would have a bearing on the rate of absorption, a given quantity of ether probably entering the blood stream in young people, in

considerable less time than it would in those past middle life; (3) position of the solution in the large intestine has, undoubtedly, a marked influence on the rate of absorption. It is impossible to know just how high it goes in any particular case, which adds to the uncertainty; but it seems highly probable that in some cases reverse persistalsis may take place carrying the mixture into the cecum, making its recovery, in case of over dosage, practically impossible and materially increasing the rate of absorption. Practical proof of this possibility is shown in Stewart's case where a lead pencil, inserted into the rectum, soon reached the cecum from which it had to be removed. Also in Chapin's work on babies where *x*-ray examinations showed, after low injections of bismuth solution, that this material practically always reached the cecum. LeWald further states that low rectal injections of bismuth solution pass into the ileum in about 10 per cent. of cases due to incompetency of the ileocecal valve, and that in over 90 per cent. the solution reaches the cecum. That this factor has an important practical side is evidenced by the fact that the Trendelenburg position (the necessity for which cannot always be foretold) is considered by some to contraindicate the use of the method; (4) pathological conditions of the rectum, sigmoid, or descending colon might strongly retard or increase the absorption; (5) an excessive amount of ether is probably absorbed (*a*) because the induction period is prolonged (frequently requiring one-half to three-quarters of an hour), which is due to the slow absorption, the mixture having not yet reached a very high position in the intestine. Likewise, in the administration by inhalation of vapors of insufficient strength, patients can be given excessive

quantities of ether without obtaining surgical anesthesia, whereas a much smaller amount expediently administered gives the desired result in very much less time; (*b*) since olive oil is said to hold the ether in close combination and give it up slowly, absorption may continue for a considerable time after operation and delay the recovery, as there is no way of determining how much of the mixture still remains in the intestine after the passage of tubes or irrigation; (6) the varying amount of intestinal surface exposed to the action of the mixture; (7) the claim for even and constant evaporation of ether from the mixture would hardly seem valid, for many surgical cases run more or less severe temperatures, the influence of which toward increasing the absorption must be considerable in view of the low boiling point of ether.

Among other theoretical objections would be the possibility of a special form of toxemia from absorption; for a powerful solvent is placed immediately before it is to enter the blood stream, in direct contact with a variable amount of highly toxic intestinal material. Does it not seem possible, therefore, that definite quantities of toxines may thus be assisted to re-enter the circulation? If so an extra burden is placed upon the eliminative functions, and the vitality of the patient suffers accordingly. Furthermore, the mode of reaching the vital centers by the anesthetic is circuitous, it having to first enter the venous blood and be conducted through the portal system before reaching the right heart and lungs. It would seem desirable to introduce an anesthetic into as clean and accessible a part of the body as possible where it may immediately enter the arterial circulation, and reach the nerve centers by the most direct course. The

pulmonary route fully meets these requirements. The routine use of morphine is said to be necessary with the rectal method, which has the disadvantage of depressing the respiratory center and locking up the secretions; objections which here seem to have special import. Furthermore, the respiratory center cannot utilize its protective function against over-dosage in the rectal method, as it may in the inhalation methods where the administration is under direct control, because with the former depressed and superficial breathing does not automatically lessen the intake of ether, since the dosage is independent of this protection. In fact, the opposite appears to occur since the more ether absorbed the greater the respiratory depression and the less the respiratory interchange, resulting in retarded elimination with consequent cumulative ether effect. Lastly, that a normal anus should often be severely irritated in this procedure seems only natural to expect, and if a fissure or hemorrhoids were present the outcome might be quite serious.

The advantages of the oil-ether method outside of its simplicity seem to be more apparent than real. In fact, with the possible exception of selected cases of bronchoscopy, it is difficult to see any indication for its use that cannot be as well and probably more safely met by the modern pulmonary methods.[1] Its chief advantages are said to be found in surgery of the head and neck, since there is no hindrance to the operator in the way of anesthetic apparatus. The ordinary intratracheal catheter could not inconvenience the surgeon much, either, and the intratracheal method offers a much greater margin of safety to the patient, especially in surgery about the face, mouth, and neck, for several

reasons; first, because it affords an efficient protection against pneumonia of the aspiration type; second, because it provides a delicate and even control of the ether dosage, enabling one to maintain a very light narcosis, and establish the coughing reflex at the close of the operation; third, it further conserves the patient's vitality by providing perfect aeration, thus obviating any possibility of obstructed breathing or necessity of packing off the throat, with the use of nasal tubes. In our series of intratracheal anesthesias we note that it has been employed forty times in operations about the head and neck (over half of which were resections of the upper and lower jaw and tongue and plastic procedures), without a single case of pneumonia or anesthetic complication, except one case of subcutaneous emphysema,[2] which recovered. On the other hand, the only jaw resection we have done with the oil-ether method died with an aspiration type of pneumonia twenty-two hours after operation. This patient, a fairly vigorous man of about fifty years, really never recovered from the anesthetic, and was in a most profound state of narcosis for nearly six hours. Six ounces of ether and two ounces of olive oil were administered in the usual manner, and both before and after the operation was completed the colon was repeatedly irrigated without apparent benefit. This case is cited here simply to point out one of the method's shortcomings in this kind of work. Another advantage is said to be the very quiet type of anesthesia produced, which is common in any method where there is a free air-way. But it must be remembered that most patients profoundly under ether behave in this manner. In a good ether anesthesia the depth of narcosis is intelligently and gradually

varied to meet the operative requirements during the different stages of the operation. This would appear to be possible only when the dosage is under direct and definite control.

In closing these remarks it may be well to mention some of the undesirable clinical features which must certainly be looked for in a method involving so many theoretical objections. The following are offered for consideration: (1) The rather exhaustive and unpleasant experience accompanying any special rectal preparation, as required here; (2) the occasional necessity and inconvenience of preliminary and subsequent proctoscopic examinations, as a matter of safety and caution; (3) occurrence during the induction period of cramps, with distressing sensations of fullness and pressure in the lower bowel, accompanied by desire for stool; varying degrees of anal irritation occuring early or late; (4) prolonged induction stage with frequent necessary recourse to the inhalation method; (5) any time after the first fifteen or twenty minutes' respiratory depression may rather suddenly or slowly appear, followed by arrested breathing, loss of muscular tone and diluted pupils, with the possibility of fatal syncope supervening; (6) the occurrence of mild to very severe grades of proctitis and colitis, these complications appearing in more aggravated forms where any pre-existent pathological condition is present; (7) delayed recovery, which may be prolonged for many hours; (8) increased toxemia, dependent on a number of factors already discussed and which has recently been pointed out by Coburn.[3]

We believe that any method of administering ether to children, old people, or cases at any age where there is more than the average risk, that

does not provide for immediate and definite control at all times, is certainly hazardous. It is also contended that any principle of administration which attempts to figure the dosage of ether on the basis of body weight is unscientific and impractical; because the influence and importance of personal equation in drug dosage is a matter of every day experience, and in operative work there are a number of other factors which always play an important rôle in the amount of anesthetic required.

To point out some of the theoretical shortcomings of a method does not necessarily condemn that procedure; but by presenting the possibility of undesirable or dangerous symptoms and results, it may help to temper with conservatism the light-hearted manner in which many of these new propositions are taken up, especially by those who are inexperienced.

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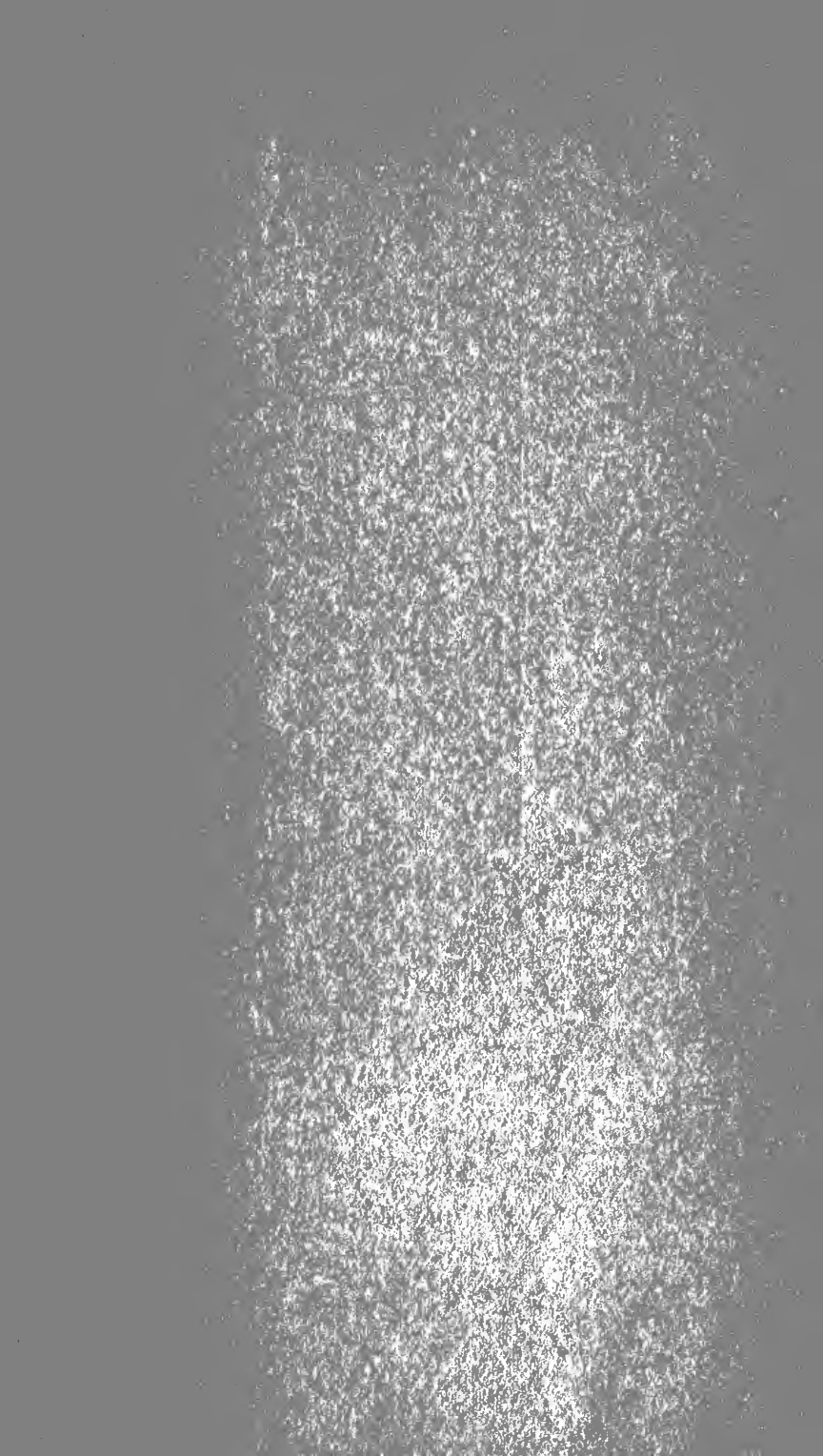

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